U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Phyllostegia hispida*

COMMON NAME: No common name

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: July 2005

STATUS/ACTION
___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status
___ New candidate
__X_ Continuing candidate
___ Non-petitioned
_X__ Petitioned - Date petition received: May 11, 2004
__ 90-day positive - FR date:
_X_ 12-month warranted but precluded - FR date: May 11, 2005
_N_ Did the petition request a reclassification of a listed species?
FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).
___ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): 1997
___ Candidate removal: Former LP: __
___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Lamiaceae (Mint family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Molokai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Molokai

LAND OWNERSHIP: The single known wild individual of *Phyllostegia hispida* occurs on a State-owned Natural Area Reserve.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Phyllostegia hispida* is a loosely spreading many-branched vine that often forms large tangled masses. Leaves are thin and flaccid with hispid hairs and glands. The margins are irregularly and shallowly lobed. Six to eight flowers make up each verticillaster. Flowers are white and nutlets are approximately 2.5 millimeters (0.01 inches) long (Wagner *et al*. 1999a).

Taxonomy *Phyllostegia hispida* was first described by Hillebrand. This species is recognized as a distinct taxon in Wagner *et al*. (1999a) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat *Phyllostegia hispida* occurs in wet forest at elevations between 700 to 1,280 meters (2,300 to 4,200 feet) (Wagner *et al*. 1999a).

Historical and Current Range/Current Status The historic range of this species was wet forests of eastern Molokai. In 2004, *Phyllostegia hispida* was known from only two plants, one in The Nature Conservancy of Hawaii's Kamakou Preserve and one in the State's Puu Alii Natural Area

Reserve (The Nature Conservancy of Hawaii 1996; Rick Potts, Kalaupapa National Historic Park, pers. comm. 1999). Since then, the individual in Kamakou Preserve has died (Ken Wood, National Tropical Botanical Garden, pers. comm. 2005).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
This species is highly and imminently threatened by feral pigs (*Sus scrofa*) that degrade and destroy habitat (R. Potts, pers. comm. 1999; Joel Lau, Hawaii Natural Heritage Program, pers. comm. 2000). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitat on Molokai. Pigs are currently present on Molokai and four other islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample and eat native plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish (Smith 1985; Stone 1985; Cuddihy and Stone 1990; Medeiros *et al*. 1986; Scott *et al*. 1986; Tomich 1986; Wagner *et al*. 1999a). Fencing was done to protect the Kamakou population but the single individual there subsequently died.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.
Because Hawaii's native plants evolved without any browsing or grazing mammals present, many lost natural defenses to such impacts (Carlquist 1980, Lamoureux 1994). Browsing by ungulates has been observed on many other native species, including common and rare or endangered species (Cuddihy and Stone 1990; Loope *et al.* 1991). Therefore, even though there are no observations of browsing for this species, it is likely that pigs impact this species directly as well as their indirect impacts to the surrounding habitat. A fence was constructed to protect the Kamakou population but the single individual there subsequently died.

D. The inadequacy of existing regulatory mechanisms.
Pigs are managed in Hawaii as game animals, but many populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers. Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Lands and Natural Resources n.d.-a, n.d. b, n.d.-c). However, public hunting does not adequately control the number of ungulates to eliminate this threat to native plant species. A fence was constructed to protect the Kamakou population but the single individual there subsequently died.

E. Other natural or manmade factors affecting its continued existence.
Species like *Phyllostegia hispida*, known from few wild individuals and endemic to a single

small island, are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by genetic bottlenecks, random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks. In addition, with only one extant wild plant, reduced reproductive vigor is also a major threat to this species (J. Lau, pers. comm. 2000). *P. hispida* is therefore threatened with extinction in the foreseeable future. The University of Hawaii's Lyon Arboretum had material from both wild individuals in micropropagation in 2005.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

A protective 12-square meter (129-square foot) exclosure fence was constructed around the plant in the Kamakou Preserve, which protected this plant from pig damage, but did not allow for the long-term recruitment of adequate individuals to recover the population. Since the fence was constructed, the one individual within it has died of unknown causes. The University of Hawaii's Lyon Arboretum has material from both wild individuals in micropropagation.

The Service has been working with an informal group of interested individuals, organizations, and agencies on Maui to protect plant species on Maui, Molokai, and Lanai on the brink of extinction, including *Phyllostegia hispida*. The group is just beginning to compile information on needed actions. Funding has been provided by the Service (2005) to initiate highest priority actions over the next year.

SUMMARY OF THREATS:

The greatest threat to this taxon at this time is the lack of regeneration. The other major threat to this species include feral pigs that directly prey upon it and degrade and destroy habitat, erosion, and reduced reproductive vigor and extinction due to stochastic events. Feral pigs have been fenced out of the Kamakou habitat where this taxon formerly occurred. Currently, there are no cultivated plants available for outplanting or reintroduction to this fenced site. The material in *ex situ* collection is in micropropagation and it is unknown whether the material will transfer to the nursery for normal propagation methods needed for reintroduction. This species is not recovering and continues to decline. The other remaining individual is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	**2***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6

Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:
Magnitude:
This species is highly threatened by feral pigs that potentially directly prey upon it and degrade and destroy habitat, and reduced reproductive vigor and extinction due to stochastic events. Threats to the wet forest habitat of *Phyllostegia hispida* and to the remaining wild individual of this species occur throughout its range and are expected to continue or increase without control or eradication. The one remaining wild individual is highly threatened with extinction risk. This species is not recovering and has declined to one individual.

Imminence:
Threats to *Phyllostegia hispida* from feral pigs, habitat destruction and degradation, and reduced reproductive vigor are imminent because they are ongoing.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? Yes. While the historic range of this species was wet forests of eastern Molokai, in 2004 *Phyllostegia hispida* was known from only two plants, one in The Nature Conservancy of Hawaii's Kamakou Preserve and one in the State's Puu Alii Natural Area Reserve. In the past year, the individual in Kamakou Preserve has died. This remaining wild individual of this species is highly threatened by feral pigs, and reduced reproductive vigor and extinction due to stochastic events. The University of Hawaii's Lyon Arboretum has material from both wild individuals in micropropagation .

DESCRIPTION OF MONITORING:
Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995 and November 1996. We have incorporated additional information on this species from our files including personal communications with Rick Potts, Kalaupapa National Historical Park in 1999 and Joel Lau, Hawaii Natural Heritage Program in 2000. In addition, we have incorporated information from the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information on status or threats was provided in 2004. In 2005 we contacted the species experts listed below, and no new individuals were found

in a 2005 survey conducted by Ken Wood, National Tropical Botanical Garden.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004. Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Endangered (at risk of extinction) by Wagner *et al*. (1999b).

The species has been minimally monitored, and a species expert has provided new information confirming the status of the species this year and the results are included in this assessment.

COORDINATION WITH STATES:
In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED
List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood *	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized:

Carlquist, S. 1980. Hawaii: A natural history, 2nd edition. Pacific Tropical Botanical Garden, Honolulu. 468 pp.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of

humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.
Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.
Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.
Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.
Lamoureux, C.H. 1994. Conserving Hawaiian biodiversity – the role of Hawaiian botanical gardens. Pp. 55-57. In: C.-I Peng and C.H. Chou (eds.). Biodiversity and Terrestrial Ecosystems. Institute of Botany, Academia Sinica Monograph Series No. 14.
Loope, L.L., A.C. Medeiros, and B.H. Gagné. 1991. Recovery of Vegetation of a montane bog following protection from feral pig rooting. Coop. Natl. Park Resources Studies Unit, Univ. Hawaii/Manoa, Dept. Of Botany, Tech. Rept. 77.
Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59:1-230.
Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9: 1-429. Cooper Ornithological Society, Los Angeles.
Smith, C.W. 1985. Impact of alien plants on Hawai`i's native biota: *In* Stone, C.P., and J.M. Scott (eds.), Hawai`i's terrestrial ecosystems: preservation and management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
Stone, C.P. 1985. Alien animals in Hawai`i's native ecosystems: toward controlling the adverse effects of introduced vertebrates: *In* Stone, C.P., and J.M. Scott (eds.), Hawai'i's terrestrial ecosystems: preservation and management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 251-297.
The Nature Conservancy of Hawaii. 1996. Emergency management of at-risk plants, Progress Report for Kamakou Preserve, Molokai, 8 pp + appendices.
Tomich, P.Q. 1986. Mammals in Hawai`i; a synopsis and notational bibliography. Bishop Museum Press, Honolulu. 375 pp.
Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a Manual of the Flowering Plants of Hawai`i, Bishop Mus. Spec. Publ. 97: 1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.
Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.
Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai‘i, version 3.1. December 12, 2003. Available from the Internet. URL: http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Acting _____ 11/16/05
Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 27, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 14, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 14, 2005
Field Supervisor